Abstract Submitted
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Bloch-band Approach for Precision Atom Interferometry with Yb Bose-Einstein Condensates[1] TAHIYAT RAHMAN, DANIEL GOCHNAUER, ANNA WIRTH, KATHERINE MCALPINE, SUBHADEEP GUPTA, University of Washington — We report on progress towards a precision measurement of the fine-structure constant, α, via a photon recoil measurement in our ytterbium (Yb) Bose-Einstein condensate (BEC) interferometer deployed through a pulsed standing wave optical lattice. Building on earlier work applying a Bloch-band picture for atom diffraction and interferometry [1] we have now devised and characterized a method using excited-band Bloch oscillations (BOs) to minimize diffraction phases and demonstrated high efficiency $40\hbar k$ momentum transfer in an atom interferometer using this technique [2]. We are currently implementing a contrast interferometer [3] with large momentum separation through BOs in a vertical geometry. The vertical geometry increases our interferometer time thereby increasing sensitivity for metrological applications. [1] D. Gochnauer et al, Phys Rev A 100, 043611 (2019). [2] K. McAlpine et al, arXiv:1912.08902 [3] B. Plotkin-Swing et al, Phys. Rev. Lett. 121, 133201 (2018).

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